PATENT
3273-0121P

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Yasutaka ISHII et al.

Appl. No.: 09/622,001

Filed: September 22, 2000

Conf. No.: 5966

Before the Board of Appeals

Appeal No.:

Group: 1626

Examiner: Taofiq SOLOLA

For: PROCESS FOR PRODUCING ORGANIC COMPOUNDS USING CATALYTIC IMIDE COMPOUNDS

# APPEAL BRIEF

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For: PROCESS FOR PRODUCING ORGANIC COMPOUNDS USING CATALYTIC IMIDE COMPOUNDS

**BRIEF ON APPEAL**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

June 3, 2003

Sir:

This is an appeal from the Final Rejection of December 4, 2002.

***(1) Real party in interest.***

The real party in interest in this appeal is Daicel Chemical Industries, Ltd., of Osaka, Japan. Daicel is the Assignee of the present application.

***(2) Related appeals and interferences.***

There are no related appeals or interferences.

***(3) Status of claims.***

Claims 1-21 were presented in the application as filed. In an Amendment filed on August 7, 2002, Applicants cancelled claims 4-13 and

added new claim 22, leaving claims 1-3 and 14-22 in the application. In the Final Rejection of December 4, 2002, the Examiner indicated that claims 1, 2, 21, and 22 were rejected.

***(4) Status of Amendments.***

On March 4, 2003, Applicants proposed an Amendment, the only change in which was to cancel claim 22. In an Advisory Action mailed March 17, 2003, the Examiner refused to enter that Amendment. Applicants respectfully request that the Examiner reconsider his position and enter the cancellation of claim 22, leaving claims 1-3 and 14-21 in the application.

***(5) Summary of invention.***

The present invention provides a process for producing an organic compound, which is an addition or substitution reaction product of a compound (A) and a compound (B) or an oxidized product thereof, in the presence of molecular oxygen and a specified catalytic imide compound. Specification, page 6, first full paragraph. Compounds (A) may be (A1) oxygen-atom-containing compounds each having a carbon-hydrogen bond at the adjacent position to an oxygen atom, (A2) carbonyl-group-containing compounds, or (A3) compounds each having a hydrocarbon group with a methine carbon atom. Compounds (B) may be

(B1) unsaturated compounds, (B2) compounds each having a hydrocarbon group with a methine carbon atom, or (B3) heteroatom-containing compounds,

provided that if a 1,2-dicarbonyl compound or its hydroxy reductant is used as the compound (A), the compound (B) is a radical scavenging compound selected from the compounds (B1) and (B3). Specification, page 10, 3rd-to-last line through page 11, 11th line. The significance of the present invention resides in its provision of a ***class*** of imide catalysts that can be used in a ***class*** of reactions

to produce ***classes*** of compounds. Although Applicants have provided 38 working Examples relating to a wide variety of compounds, they do not consider that their invention resides in the details of the production of each individual compound.

***(6) Issues.***

The sole issue being appealed is whether claims 1, 2, and 21 are properly rejected under the second paragraph of 35 U.S.C. §112 as failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention.

***(7) Grouping of claims.***

Inasmuch as claim 2 differs significantly in its scope and language from claim 1 (and 21), the rejection of claim 2 is deemed to be arguable separately.

***(8) Argument.***

Claims 1, 2, 21, and 22 stand rejected under the second paragraph of 35 U.S.C. §112 as failing to define the invention properly. Applicants have offered to cancel claim 22. The rejection is respectfully traversed with respect to claims 1, 21, and 2.

The presently claimed synthetic process involves the reaction of two classes of compounds, designated in claim 1 as (A) and (B). Claim 2 reacts a species of (A) designated as (A11) and a species of (B) designated as (B11). Claim 3 reacts a species of (A) designated as (A11) and a species of (B) designated as (B12). Claim 14 reacts a species of (A) designated as (A12) and a species of (B) designated as (B13). Claim 15 reacts a species of (A) designated as (A13) and a species of (B) designated as (B11). Claim 16 reacts a species of (A) designated as (A31) and a species of (B) designated as (B11). Claim 17 reacts a species of (A)

designated as (A31) and a species of (B) designated as (B14). Claim 18 reacts a species of (A) designated as (A31) and a species of (B) designated as (B15). Claim 19 reacts a species of (A) designated as (A11) and a species of (B) designated as (B21). Claim 20 reacts a species of (A) designated as (A32) and a species of (B) designated as (B22). Claims 1 and 21 are generic as to compounds (A) and (B).

It is well settled that chemical compounds may be claimed by any name that adequately describes the material to one skilled in the art. See *Martin v. Johnson*, 172 USPQ 391. A compound may also be clamed in terms of the process by which it is made without raising an issue of indefiniteness.

The Examiner alleges that the claims herein are rendered indefinite by the terminologies "organic compound", "compound capable of forming a stable radical", and "oxygen-atom-containing compounds". None of these terminologies is *per se* indefinite, particularly to the sophisticated chemistry experts to which the present disclosure is directed.

A claim to a chemical compound is not indefinite merely because a structure is not presented or because a partial structure is presented. For example, the claim language at issue in *In re Fisher*, 166 USPQ 18 referred to a chemical compound as a "polypeptide of at least 24 amino acids having the following sequence". A rejection under the second paragraph of 35 U.S.C. §112 for failure to identify the entire structure was reversed and the court held: "While the absence of such a limitation obviously broadens the claim and raise questions of sufficiency of disclosure, it does not render the claim indefinite." Similarly, in *In re Skoll*, 187 USPQ 481, the court held that the broad language "organic and inorganic acids" was not indefinite, and that the functional language "water soluble hydrolyzed carbohydrate" was acceptable because it was adequately defined in the specification.

Here, each of the terminologies noted by the Examiner is qualified in the claims themselves. Thus, the "organic compound" of the claims is a reaction

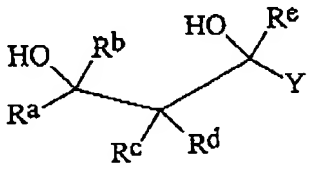
product of compounds (A) and (B), and logically incorporates the features of (A) and (B). The "compound capable of forming a stable radical" is selected from compounds (A1), (A2), and (A3), each of which adds a further definition to the language in question. The "oxygen-atom-containing compounds" are defined as being those which have a carbon-hydrogen bond at the adjacent position to an oxygen atom and which are capable of forming a stable radical. Each of these terminologies is, moreover, supported by explanatory disclosure in Applicants' lengthy specification.

In *In re Mercier*, 185 USPQ 774, the language "a fluidized catalyst" was found not to be indefinite. The court reasoned that

> if one can determine whether a particular catalytic process for splitting acetals and hemiacetals is or is not within the scope of a claim, the claim fulfills its purpose as a definition.

185 USPQ at 780. In the present application, one can readily determine whether a particular catalytic process for producing an organic addition or substitution reaction product is within the scope of each and any of claims 1-3 and 14-21.

CLAIM 2. Claim 2 specifies that the organic compound produced is a 1,3-dihydroxy compound shown by the following formula (4):




(4)

wherein $R^a$, $R^b$, $R^c$, $R^d$, $R^e$, and Y are as defined in the claim. The Examiner has not explained how claim 2, which does not include the language "compound capable of forming a stable radical" or "oxygen-atom-containing compounds", is indefinite.

FIELD OF SEARCH IRRELEVANT. In the Final Rejection, the Examiner indicated that chemical processes are classified by the PTO based upon the products which they produce, and that the present claims would therefore fall within a large number of different subclasses. In the Advisory Action, the Examiner alleged that "the claims are not clear and distinct and therefore not classifiable or searchable".

The statute does not require that applicants define their invention in terms of the PTO classification system, but only that applicants particularly point out and distinctly claim what they regard as their invention. In this case, Applicants' invention relates to the use of a particular ***class*** of imide compounds to catalyze a ***class*** of reactions.

> Specifically, the invention relates to a process of allowing two compounds to react with each other in the presence of a specific imide compound and a radical generator with respect to the imide compound to yield a product of an addition or substitution reaction or an oxidized product thereof by a radical mechanism.

Specification, page 1. Since all of the processes of the present invention require the utilization of specified imide catalysts, searches for relevant prior art should presumably include a search keyed to those imide compounds. In any case, search considerations are manifestly irrelevant to considerations of compliance with 35 U.S.C. §112.

**Conclusion**

Claims 1-3 and 14-21 herein clearly define generic and specific aspects of a single invention in the manner prescribed by the second paragraph of 35 U.S.C. §112. Accordingly, the rejection of record should not be sustained.

For any questions concerning this application, please contact Richard Gallagher, Reg. No. 28,781, at (703) 205-8008.

Serial No.: 09/622,001
Attorney Docket Number 3273-0121P

The required Appeal Brief fee in the amount of $320.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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RCS/RG
Attachment: Appendix

***(9) Appendix.***

1. A process for producing an organic compound which is an addition or substitution reaction product of a compound (A) and a compound (B) or an oxidized product thereof, said process comprising the step of allowing

(A) a compound capable of forming a stable radical and being selected from

(A1) oxygen-atom-containing compounds each having a carbon-hydrogen bond at the adjacent position to an oxygen atom,

(A2) carbonyl-group-containing compounds, and

(A3) compounds each having a hydrocarbon group with a methine carbon atom

to react with

(B) a radical scavenging compound selected from

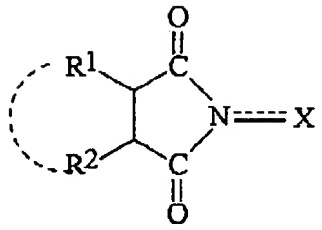
(B1) unsaturated compounds,

(B2) compounds each having a hydrocarbon group with a methine carbon atom, and

(B3) heteroatom-containing compounds,

provided that if a 1,2-dicarbonyl compound or its hydroxy reductant is used as the compound (A), the compound (B) is a radical scavenging compound selected from the compounds (B1) and (B3),

in the presence of a catalytic imide compound and in the presence of molecular oxygen, by catalysis of the imide compound, wherein the imide compound is shown by the following formula (1):



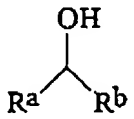
(1)

wherein each of $R^1$ and $R^2$ is, identical to or different from each other, a hydrogen atom, a halogen atom, an alkyl group, an aryl group, a cycloalkyl group, a hydroxyl group, an alkoxy group, a carboxyl group, an alkoxycarbonyl group, or an acyl group, where $R^1$ and $R^2$ may be combined to form a double bond, or an aromatic or non-aromatic ring; X is an oxygen atom or a hydroxyl group; and one or two N-substituted cyclic imido groups indicated in the formula (1) may be further bonded to said $R^1$, $R^2$, or to the double bond or aromatic or non-aromatic ring formed together by $R^1$ and $R^2$,

to yield a product of an addition or substitution reaction of said compound (A) and said compound (B) or an oxidized product thereof.

2. A process for producing an organic compound according to claim 1, wherein

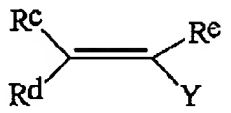
compound (A) is (A11) an alcohol shown by the following formula (2):



(2)

wherein each of $R^a$ and $R^b$ is, identical to or different from each other, a hydrogen atom or an organic group, where $R^a$ and $R^b$ may be combined to form a ring with the adjacent carbon atom, and

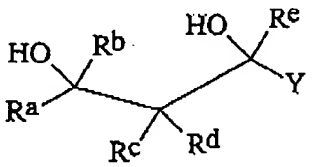
compound (B) is (B11) an active olefin shown by the following formula (3):



(3)

wherein each of $R^c$, $R^d$, and $R^e$ is, identical to or different from one another, a hydrogen atom or an organic group, and Y is an electron attracting group, where $R^c$, $R^d$, $R^e$, and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond, and

wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is a 1,3-dihydroxy compound shown by the following formula (4):

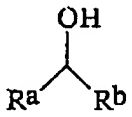


(4)

wherein $R^a$, $R^b$, $R^c$, $R^d$, $R^e$, and Y have the same meanings as defined above.

3. The process for producing an organic compound according to claim 1, wherein

compound (A) is (A11) an alcohol shown by the following formula (2):

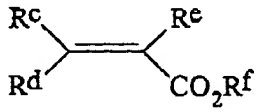


(2)

wherein each of $R^a$ and $R^b$ is, identical to or different from each other, a hydrogen atom or an organic group, where $R^a$ and $R^b$ may be combined to form a ring with the adjacent carbon atom,

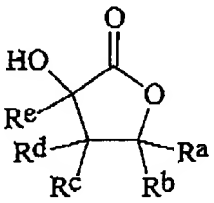
and

compound (B) is (B12) an α,β-unsaturated carboxylic acid derivative shown by the following formula (5):



(5)

wherein each of $R^c$, $R^d$, $R^e$, and $R^f$ is, identical to or different from one another, a hydrogen atom or an organic group, where $R^c$, $R^d$, and $R^e$ may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond, and wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is an α-hydroxy-γ-butyrolactone derivative shown by the following formula (6):

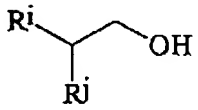


(6)

wherein $R^a$, $R^b$, $R^c$, $R^d$, and $R^e$ have the same meanings as defined above.

14. A process for producing an organic compound according to claim 1, wherein

compound (A) is (A12) an alcohol shown by the following formula (2a):



(2a)

wherein each of $R^i$ and $R^j$ is, identical to or different from each other, a hydrogen atom or an organic group, where $R^i$ and $R^j$ may be combined to form a ring with the adjacent carbon atom,

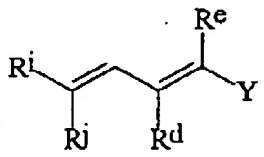
and

compound (B) is (B13) an active olefin shown by the following formula (3a):

(3a)

wherein each of $R^d$ and $R^e$ is, identical to or different from each other, a hydrogen atom or an organic group; and Y is an electron attracting group, where $R^d$, $R^e$ and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond,

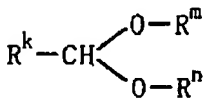
and wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is a conjugated unsaturated compound shown by the following formula (11):



(11)

wherein $R^d$, $R^e$, $R^i$, $R^j$ and Y have the same meanings as defined above.

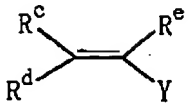
15. A process for producing an organic compound according to claim 1, wherein (A13) an acetal shown by the following formula (12):



(12)

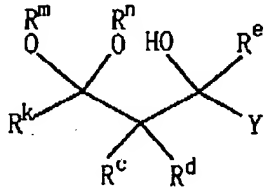
wherein each of $R^k$, $R^m$, and $R^n$ is, identical to or different from one another, a hydrogen atom or an organic group, where $R^m$ and $R^n$ may be combined to form a ring with the adjacent two oxygen atoms and the carbon atom indicated in the formula,

is allowed to react with (B11) an active olefin shown by the following formula (3):



(3)

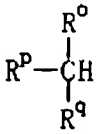
wherein each of $R^c$, $R^d$, and $R^e$ is, identical to or different from one another, a hydrogen atom or an organic group, and Y is an electron attracting group, where $R^c$, $R^d$, $R^e$, and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond,
in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield a β-hydroxyacetal compound shown by the following formula (13):



(13)

wherein $R^c$, $R^d$, $R^e$, $R^k$, $R^m$, $R^n$, and Y have the same meanings as defined above.

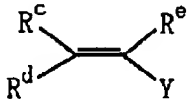
16. A process for producing an organic compound according to claim 1, wherein (A31) a compound having a methine carbon atom and being shown by the following formula (14):



(14)

wherein each of $R^o$, $R^p$, and $R^q$ is, identical to or different from one another, an organic group, where $R^o$, $R^p$, and $R^q$ may be combined to form a ring with the adjacent carbon atom,

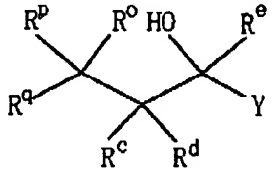
is allowed to react with (B11) an active olefin shown by the following formula (3):



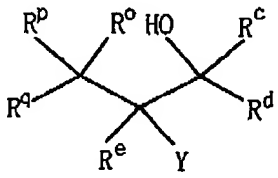
(3)

wherein each of $R^c$, $R^d$, and $R^e$ is, identical to or different from one another, a hydrogen atom or an organic group; and Y is an electron attracting group, where $R^c$, $R^d$, and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond,

in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield at least one hydroxy compound selected from the following formulae (15) and (16):



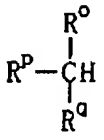
(15)



(16)

wherein $R^c$, $R^d$, $R^e$, $R^o$, $R^p$, $R^q$, and Y have the same meanings as defined above.

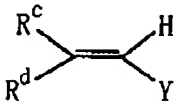
17. A process for producing an organic compound according to claim 1, wherein (A31) a compound having a methine carbon atom and being shown by the following formula (14):



(14)

wherein each of $R^o$, $R^p$, and $R^q$ is, identical to or different from one another, an organic group, where $R^o$, $R^p$, and $R^q$ may be combined to form a ring with the adjacent carbon atom,

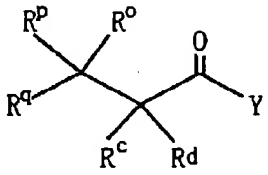
is allowed to react with (B14) an active olefin shown by the following formula (3b):



(3b)

wherein each of $R^c$ and $R^d$ is, identical to or different from each other, a hydrogen atom or an organic group; and Y is an electron attracting group, where $R^c$, $R^d$, and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond,

in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield a carbonyl compound shown by the following formula (17):

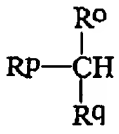


(17)

wherein $R^c$, $R^d$, $R^o$, $R^p$, $R^q$, and Y have the same meanings as defined above.

18. The process for producing an organic compound according to claim 1, wherein

compound (A) is (A31) a compound having a methine carbon atom and being shown by the following formula (14):



(14)

wherein each of $R^o$, $R^p$ and $R^q$ is, identical to or different from one another, an organic group, where $R^o$, $R^p$, and $R^q$ may be combined to form a ring with the adjacent carbon atom,

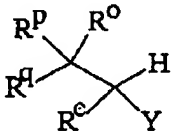
and

compound (B) is (B15) an active olefin shown by the following formula (3c):

(3c)

wherein $R^e$ is a hydrogen atom or an organic group; and Y is an electron attracting group,

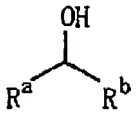
and wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is an organic compound shown by the following formula (18):



(18)

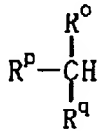
wherein $R^e$, $R^o$, $R^p$, $R^q$, and Y have the same meanings as defined above.

19. A process for producing an organic compound according to claim 1, wherein (A11) an alcohol shown by the following formula (2):



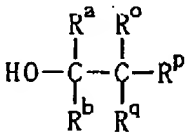
(2)

wherein each of $R^a$ and $R^b$ is, identical to or different from each other, a hydrogen atom or an organic group, where $R^a$ and $R^b$ may be combined to form a ring with the adjacent carbon atom,
is allowed to react with (B21) a compound having a methine carbon atom and being shown by the following formula (14):



(14)

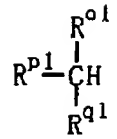
wherein each of $R^o$, $R^p$, and $R^q$ is, identical to or different from one another, an organic group, where $R^o$, $R^p$, and $R^q$ may be combined to form a ring with the adjacent carbon atom,
in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield an alcohol shown by the following formula (19):



(19)

wherein $R^a$, $R^b$, $R^o$, $R^p$, and $R^q$ have the same meanings as defined above.

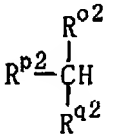
20. A process for producing an organic compound according to claim 1, wherein (A32) a compound having a methine carbon atom and being shown by the following formula (14a):



(14a)

wherein each of $R^{o1}$, $R^{p1}$ and $R^{q1}$ is, identical to or different from one another, an organic group, where $R^{o1}$, $R^{p1}$ and $R^{q1}$ may be combined to form a ring with the adjacent carbon atom,

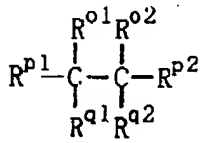
is allowed to react with (B22) a compound having a methine carbon atom and being shown by the following formula (14b):



(14b)

wherein each of $R^{o2}$, $R^{p2}$ and $R^{q2}$ is, identical to or different from one another, an organic group, where $R^{o2}$, $R^{p2}$ and $R^{q2}$ may be combined to form a ring with the adjacent carbon atom,

in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield a coupling product shown by the following formula (20):



(20)

wherein $R^{o1}$, $R^{p1}$, $R^{q1}$, $R^{o2}$, $R^{p2}$ and $R^{q2}$ have the same meanings as defined above.

21. A process according to one of claims 1 to 3 and 14 to 20, wherein a metallic compound is used as a co-catalyst.